

Materials Science and Technology Division

personal *profile*

Light-as-air material gives Kimberly DeFriend room to explore her creative side

Like an artist exploring her medium, Kimberly DeFriend crafts aerogels.

Donning her white lab coat, she uses her creativity to analyze the brittle, light-as-air materials' unique properties and refine the science and engineering of their fabrication.

Composed of as much as 99 percent air, aerogels "are a truly exciting material," said DeFriend, a technical staff member in the Materials Science and Technology Division's Polymers and Coatings Group (MST-7). Working alongside MST-7 technician Brent Espinoza, DeFriend synthesizes silica aerogels for high energy physics and inertial confinement fusion experiments.

The highly porous, transparent, fragile materials "are like solid nothing," but extremely versatile, she said. Used in a range of applications and products—from thermal insulation and shock absorption to body armor and cometary dust capture agents, aerogels have been the focus of intense research "but there is still much that is not well understood," she said.

A natural for science

As the daughter of a Shell Chemical Company chemist and a regular participant in school science fairs, DeFriend found it natural to go into the sciences after high school. Her first interest was environmental chemistry, particularly issues related to water treatment and pollution removal. "I wanted to try and solve the real important problems," she said. "And at the time that involved environmental issues."

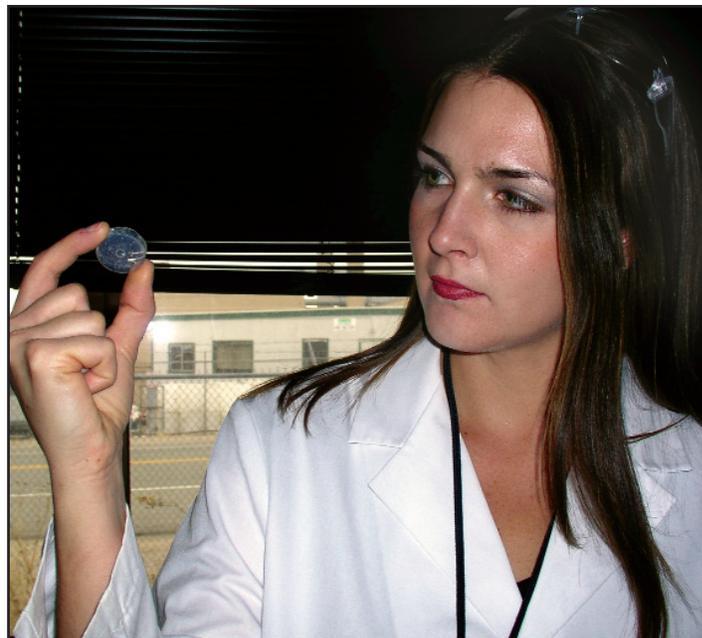
Her work with ultrafiltration membranes eventually led her to earn her doctorate in inorganic chemistry at Rice University working with Andrew Barron and to discover a love of experimenting in the laboratory.

Carving a niche for herself

Arriving at Los Alamos National Laboratory in 2002 as a postdoctoral research associate, DeFriend originally worked on laser-assisted chemical vapor deposition processing of materials. Although she'd heard of aerogels, she didn't know exactly what they were or their applications.

Yet after discussing the aerogel research project with then-LANL staff members Doug Loy and Kenny Salazar, DeFriend said she was excited to join the team as it seemed more in keeping with her background.

According to Loy, DeFriend "demonstrated the characteristics of a highly productive research staff member: creativity,



Kim DeFriend enjoys both the programmatic and research and development work she does with aerogels. She holds a sample she crafted.

curiosity, self-discipline, and drive." In particular, Loy, now a University of Arizona professor, noted that her "tireless efforts" on the gas phase chemical modification of aerogels generated new intellectual property for the Lab and is leading to industrial collaborations

DeFriend's research efforts are twofold. Basic research and development focused on making stronger aerogels with controllable compositions combined with producing them for high energy physics experiments, "has given Kim an important niche as the aerogel person of Los Alamos," Loy said.

She's also become an integral part of her team by her willingness to take on the details of her work, said ICF Project Leader Arthur Nobile.

"Kim knows there's a job to be done and she doesn't mind doing it, no matter what it is," whether that be dealing with the minutia of getting equipment to work or regularly contributing at team meetings, he said. "I value her willingness to do that."

Juggling responsibilities

With both programmatic and research and development responsibilities, the key to DeFriend's success is her ability to juggle competing demands—an arrangement she and her project leader consider essential.

For Arthur Nobile, DeFriend's long-term research means she is exploring options and solutions even as the project's requirements evolve. "As a young staff person Kim sees that it's important to keep the programmatic work going and that it be done right, but that it's also important for her to continue to go to con-

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ferences, publish, and keep pushing the state of the art,” Nobile said. “She’s challenged both those areas.”

For DeFriend, the dual demands are something on which she thrives. “As a chemist and as part of the scientific community I feel it’s important to remain tied to my peers,” she said. The high energy density and ICF programmatic work, on the other hand, “is important to the nation’s interests. I feel as if I am trying to help the nation with an important issue we face.”

“Los Alamos is unique in that there are certain (programmatic) deadlines and goals to be accomplished, but there’s also the academic freedom and ability to experiment,” she said. “You get the best of both worlds.”

—By Karen E. Kippen, MST Communications



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MST-7’s Kimberly DeFriend
